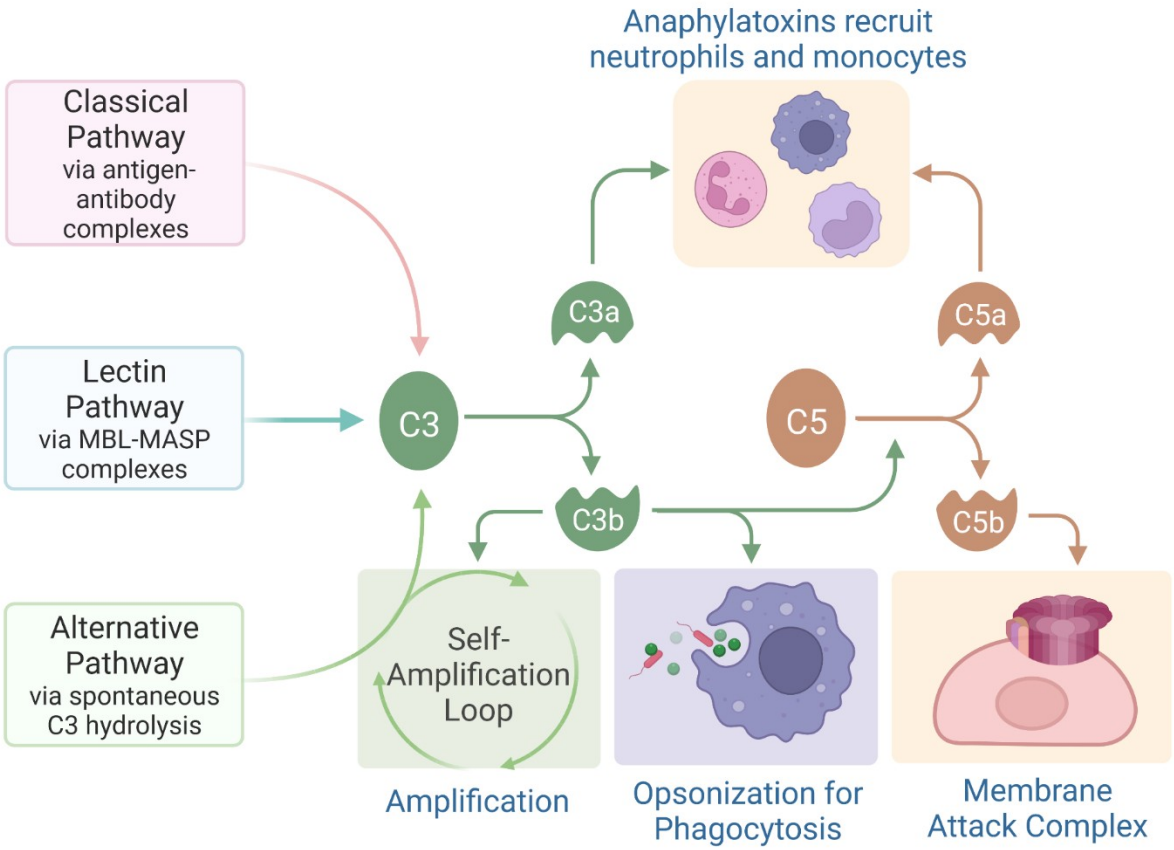
Components of the complement system

Introduction

A complex of over 30 soluble proteins in the blood serum and tissue fluids, known as complement system, serves to eliminate extracellular microorganisms. It does so by responding immediately and binding to molecular components of pathogens, particularly those that are already coated with antibodies. Successive complement proteins become activated in a sequential manner through their cleavage (splitting) and/or structural changes leading to a series of enzymatic cascade events that result in pathogen destruction. Complement system derives its name from the fact that it is complementary to the antibody response of adaptive immunity.

Components of the complement system

The graphic below shows selected components of the complement system.



The complement system is a collection of soluble proteins undergoing a complex series of combination and cleavage reactions. Three pathways, the classical, the lectin and the alternative pathways lead to the activation of C3 into C3a and C3b. C3b is involved in the complement self-amplification loop, in the mechanism of opsonisation to help phagocytosis

and in the cleavage of C5, another complement protein, into C5a and C5b. C5b, with other complement proteins not represented here, contributes to the Membrane Attack Complex. The anaphylatoxins C3a and C5a recruit other immune cells, such as neutrophils and monocytes.

Adapted from: "Roles of the Complement Cascade in Innate Immunity" by Ariella Coler-Reilly. Created with BioRender.com.

1. C3a – Anaphylatoxin that promotes inflammation
2. C3b – Acts as an opsonin (facilitates phagocytosis)
3. C5a – Attracts macrophages and neutrophils, activates most cells
4. MAC – Inserts in the plasma membrane of invading pathogen and creates a pore resulting in cell lysis.

The video on the next page will give you more information about the complement activation, regulation and diseases related to complement dysfunction.